FOSSIL PLANTS FROM PLUTOVILLE, CAPE YORK PENINSULA.

By A. B. Walkom, D.Sc.

(Plates xiii-xiv, and two Text-figures.)

[Read 27th April, 1928.]

The plants described below were collected by Mr. C. C. Morton at Lower Camp, Plutoville, on the Cape York Peninsula. Preliminary determinations of the species were made by me for Mr. Morton about the end of 1923 for inclusion in his geological report on the area. The manuscript of this paper was completed towards the end of 1925, the intention being for it to form a continuation of the series of papers on the Mesozoic floras of Queensland published by the Queensland Geological Survey. Cessation, for the time being, of publication of palaeontological papers by the Geological Survey has been responsible for the delay in the appearance of the paper.

The following remarks on the age of the beds were written for Mr. Morton's account of the geology of the district (*Queensland Government Mining Journal*, March and April, 1924):—

"Of some nine or ten species from Plutoville not one appears to be present in the Walloon Flora as we know it, whereas the two species of which I feel reasonably certain, viz., *Nathorstia* (probably *N. Willcoxi*) and *Microphyllopteris gleichenioides* have been found only in Cretaceous rocks in Queensland, the former in the Styx Series, the latter in the Burrum Series and also at Croydon. Furthermore, the known species of *Nathorstia* are so far confined to the Cretaceous. In view of these facts I feel satisfied to say that the Plutoville fossil plants indicate a Cretaceous age for the rocks in which they occur".

The species now described include: ? *Lycopodites* sp. A., ? *Lycopodites* sp. B., *Ruffordia Mortoni*, n. sp., *Hausmannia Wilkinsi*, n. sp., *Nathorstia Willcoxi* Walkom, *Microphyllopteris gleichenioides* (O. and M.), *Nilssonia plutovillensis*, n. sp., ? *Nilssonia* sp., *Pagiophyllum* sp. A., *Brachyphyllum crassum* (?) Tenison-Woods, *Elatocladus* cf. *conferta* (O. and M.).

The only difference calling for remark, between this list and the preliminary determinations supplied in 1923, is the absence from the revised list of *Pterophyllum*. Closer examination has led me to conclude that the specimens which I originally thought to represent two or even three species of *Pterophyllum* should all be united under a single species of *Nilssonia* for which I have proposed the name *N. plutovillensis*.

Comparison of the species in this small collection with species from other Mesozoic floras leaves little doubt that the palaeobotanical evidence points strongly to a Cretaceous age for the beds in which the plants are found. The four species of ferns (*Ruffordia Mortoni*, *Hausmannia Wilkinsi*, *Nathorstia Willcoxi* and *Microphyllopteris gleichenioides*) all indicate a Cretaceous age, the two first-named having closest affinities with species occurring in Cretaceous rocks in other

regions. *Nathorstia Willcoxi* is known only from the Styx Series (Cretaceous) in Queensland, and species of *Nathorstia* in other parts of the world are only known from Cretaceous rocks. *Microphyllopteris gleichenioides* also is known from other parts of Queensland, having been recorded from Cretaceous rocks in the vicinity of Croydon, as well as from the Burrum Series, and doubtfully, from the Styx Series. The species of *Nilssonia* are not regarded as giving reliable indication of age. The coniferous fragments do not give definite indication, both *Brachyphyllum crassum* and *Elatocladus conferta* occurring in Jurassic as well as Cretaceous rocks.

I would like to express my appreciation of the courtesy of Mr. W. N. Edwards of the Geological Department of the British Museum in connection with a collection of plants, from the same district as those described here, forwarded to the British Museum by Capt. G. H. Wilkins. Mr. Edwards enquired whether I had in hand any material from this area and, on learning that I had already prepared the preliminary account for Mr. Morton's report, he very kindly volunteered not to proceed with a description of the collection under his care. It is worthy of record that his determination of the age of the collection as Lower Cretaceous corresponded with mine. As there appear to be some specimens in the British Museum collection different from those in the Queensland Geological Survey collection I give here the list of Mr. Edwards' provisional determinations of the former.

* *Microphyllopteris* (*Gleichenites*) *gleichenioides* (O. and M.).
Microphyllopteris (*Gleichenites*) cf. *acutus* Walkom.
* *Hausmannia* cf. *Pelletieri* Sew.
* *Ruffordia acrodentata* (Font.).
Sphenopteris cf. *fittoni* Seward.
? *Sphenopteris* sp. (cf. *Coniopteris*).
* *Nilssonia schaumburgensis* (Dunk.).
Pterophyllum cf. *Lyellianum* Dunk.
* *Elatocladus* sp.
* *Brachyphyllum* sp.
* ? *Sphenolepidium* sp.
? *Pityophyllum* sp.

Those marked with an asterisk appear to be the equivalents of some of the species described below.

? Lycopodiales.

? Lycopodites sp. A. Text-fig. 1.

A single specimen shows portion of a shoot with two rows of laterally disposed leaves in one plane. The leaves are about 2 mm. long and 1 mm. wide; they have an acute, upturned apex, both lower and upper margins curving upwards away from the stem. There is a very pronounced medial depression in the leaf.

The habit of this fragment suggests a comparison with *Lycopodites falcatus* L. and H. (Seward, 1910, p. 83, fig. 137) but the specimen is not sufficiently complete for accurate determination. As no species allied to this genus has been recorded from Mesozoic rocks in Queensland it is of interest as indicating the probable existence of members of this group in these rocks.

It is not very different from portions of the fragments described from the Jurassic of Victoria as *L. victoriae* (Seward, 1904, p. 161, Pl. viii, figs. 2-4).

? Lycopodites sp. B. Plate xiii, fig. 1.

Portion of a branching shoot with short, narrow, acutely pointed leaves, apparently arranged in two rows. Leaves 3 mm. long, 1·5 mm. broad at base. Venation indeterminate.

There is a considerable degree of doubt as to whether these specimens are correctly placed in *Lycopodites*, but I figure one and suggest the possibility. Associated with these and the species described above, also referred to *Lycopodites*,

Text-fig. 1.—*Lycopodites* sp. A. (× 2).
Text-fig. 2.—*Ruffordia mortoni*, n. sp. (× 2).

are numerous delicate fragments which are regarded as coniferous, as well as small twigs which are below referred to *Pagiophyllum*. It is difficult to deal satisfactorily with them in view of the absence of specimens for comparison and of the comparatively few examples of Mesozoic Lycopodiales that have been figured. The remote locality from which the specimens were obtained makes it rather improbable that any detailed collecting from the fossil-bearing beds will be carried out there.

Filicales.

Ruffordia Mortoni, n. sp. Plate xiii, fig. 2; Text-fig. 2.

Frond tripinnate; pinnae elongate, alternate; pinnules delicate, broadly oval, divided more or less deeply into segments, contracted and decurrent at the base; ultimate segments broad, obtuse, sometimes with finely dentate margin; venation sphenopteroid.

This delicate fern is the first of its kind that I have seen from Australian Mesozoic rocks. The only one at all similar is *Coniopteris hymenophylloides* from the Jurassic of Victoria (Seward, 1904) and the Clarence Series of New South Wales (Walkom, 1919), but from this, the present specimens are quite distinct. These Queensland specimens are apparently very close to *Ruffordia Göpperti* (Dunk.) var. *latifolia* Seward (1894, p. 85, Pl. vi, fig. 1) which has been included by Berry (1911, p. 230, Pl. xxiii) as a synonym of *Ruffordia acrodentata* (Fontaine). It appears to me that on Plate xxiii of Berry's work (1911), figures 3 and 4 which are named *R. Goepperti* should be *R. acrodentata* and figures 5 and 6, named *R. acrodentata*, should be *R. Goepperti*. Some of the examples under discussion here are very close to Berry's figures 3 and 4.

All the specimens in our collection are sterile examples and in the absence of any fertile examples I have thought it wiser to give the specimens a distinct specific name, rather than to associate them with European examples, of which

the fertile pinnae are known. The European *R. Göpperti* var. *latifolia* is of Wealden age, and the American *R. acrodentata* occurs in the Patuxent and Patapsco Formations, of Cretaceous age.

Hausmannia Wilkinsi, n. sp. Plate xiii, figs. 3, 4.

Lamina broadly wedge-shaped, deeply divided into two or three narrow segments, which themselves are further divided, but not so deeply; a series of primary, dichotomously branching, radiating veins, one branch going into each ultimate segment; the spaces between the primary veins occupied by a fairly regular fine network.

In the specimens available the larger segments are about 1·5 cm. wide at their widest part and about 2 cm. long. There is a certain amount of variation which may indicate the presence of more than one species, but as the number of specimens is small all are for the present referred to a single species.

Previously the only reference to *Hausmannia* in Queensland is the doubtful one, of a single specimen from the Esk Series (Walkom, 1917*a*), which in no way resembled those now under discussion.

These specimens show a fairly close resemblance to *H. Pelletieri* described by Seward (1913, p. 89, Pl. xiv) from the Wealden Beds of Sussex, England, but the leaf appears to be much more dissected and the network of secondary veins is coarser than in that species. *H. dichotoma*, a Wealden and Jurassic species, has the lamina very deeply dissected but is a considerably larger form than ours.

Recent representatives of the family Dipteridinae to which *Hausmannia* belongs are found in New Guinea, and the discovery of this late Mesozoic species in a region not far distant is perhaps worthy of remark.

Nathorstia Willcoxi Walkom. Plate xiv, figs. 1, 2.

The examples of this species are more complete in some respects than those previously described from the Styx Series. The frond has a length of more than 8 cm. and a width of 1·0 to 1·3 cm., and is obtusely rounded at the apex, the nature of the base still remaining unknown. The veins are strong, at right angles to the midrib, 6 to 11 per cm. of lamina, and only occasionally branching, while on very rare occasions two veins join. In one example a fine network of veins can be seen between the prominent secondary veins (Pl. xiv, fig. 1). All the examples from Plutoville are sterile leaves, but it is one of the commonest species in the collection.

Microphyllopteris gleichenioides (O. and M.). Plate xiv, fig. 3.

This species has previously been recorded from the Burrum Series in the type district (Walkom, 1919*a*, p. 26) and also from the Marine Cretaceous rocks in the vicinity of Croydon. A doubtful record has also been made from the Cretaceous rocks of the Styx Series (Walkom, 1919*a*, p. 56). A similar, though larger, species, *M. pectinata*, has been described by Arber (1917) from Jurassic and Neocomian rocks in New Zealand.

Cycadophyta.

Nilssonia plutovillensis, n. sp. Plate xiii, figs. 5-7.

Frond up to about 3·5 cm. wide; rachis strong, up to 2 mm. wide, and frequently showing longitudinal folds or striations; lamina divided into segments of variable width, ranging from 2 mm. to 6 mm., attached to upper surfaces of

rachis but apparently does not cover the whole surface, leaving a central portion visible from above; veins fine, parallel, occasionally branching, 8-14 in 5 mm.

This species appears to be common. It differs from other Queensland species, and some difficulty has been experienced in comparing it with other species. The wide variation in some of the described Jurassic species would make it possible, perhaps to include these examples, e.g. with *N. compta* or *N. schaumburgensis.*

In *N. schaumburgensis,* however, the lamina completely covers the upper surface of the rachis and in this respect our specimens would appear to be different from that species. There is some degree of similarity between *N. plutovillensis* and the specimens of *N. compta* described by Arber (1917, p. 51) from Lower Jurassic rocks in New Zealand.

It is almost certain that the rocks at Plutoville, in consideration of the contained fossil flora, are of Lower Cretaceous age, and for that reason it is considered unwise to refer these specimens to any species of Jurassic age in other parts of the world. It appears at the present time that great care must be exercised in using species of *Nilssonia* and *Pterophyllum* for the purpose of fixing more exactly the age of Mesozoic rocks in which these genera occur.

? Nilssonia sp. Plate xiv, fig. 4.

Portion of a frond with long, narrow, curved pinnae 3·5-4 cm. long, acutely pointed, 0·5 cm. broad at base. The venation is very imperfectly preserved but there appear to be about 5 veins per pinna.

The single specimen here described recalls in some respects, particularly as regards the curvature of the pinnae, the figure of *N. orientalis* given by Seward (1911, Pl. x, fig. 46) from the Jurassic flora of Sutherland. It is, however, poorly preserved and no further details can be given until more material is available.

Coniferophyta.

Pagiophyllum, sp. A.

The collection contains some small twigs of a conifer which may be referred to *Pagiophyllum.* The leaves are short, broad, thick and keeled, and make a wide angle with the axis. They are 1½-2 mm. long by 1-1½ mm. broad.

These specimens can be matched closely with fragments described by T. G. Halle from the Mesozoic flora of Grahamland (1913, p. 79) and correspond closely with his Plate 9, figs. 5*a* and 6.

Brachyphyllum crassum (?) Tenison-Woods. Plate xiii, fig. 8.

A number of branched coniferous stems with broad, fleshy, spirally arranged leaves are referred to *Brachyphyllum,* and doubtfully to the common Australian species *crassum.*

There are numerous examples in the collection from Plutoville, and they show no character by which they can be separated from examples of *Brachyphyllum* already described from Jurassic and Lower Cretaceous rocks in Queensland.

Similar specimens have been described from the Jurassic of Grahamland by Halle (1913, p. 79, especially Pl. 9, f. 15, 16).

Elatocladus cf. *conferta* (O. and M.). Plate xiii, figs. 9, 10.

Numerous fragments of branches with narrow leaves may be referred to *Elatocladus.* They are smaller than and different in general appearance from

E. planus which occurs in the Walloon Series (Jurassic) and Burrum Series (Lower Cretaceous) in Queensland.

The leaves are only 6 mm. in length and about 0·5 mm. in width and have a distinct midrib.

It is compared here with *E. conferta*, with which it may be conspecific. *E. conferta* has been figured from the Jurassic of Grahamland (Halle, 1913) and of New Zealand (Arber, 1917). It may also be compared with *Taxites* sp. figured from the Uitenhage Series of South Africa by Seward (1903, Pl. 6), but this is somewhat larger than our species.

References.

Arber, E. A. N., 1917.—The earlier Mesozoic Floras of New Zealand. *N.Z. Geol. Surv., Pal. Bull.* 6.

Berry, E. W., 1911.—The Lower Cretaceous Deposits of Maryland. *Maryland Geological Survey, Lower Cretaceous.*

Halle, T. G., 1913.—The Mesozoic Flora of Grahamland. *Schwed. Sudpolar. Exped.*, 1901-1903, Bd. iii, Lief. 4.

Seward, A. C., 1894.—The Wealden Flora, Part i. *Brit. Mus. Catalogue.*

————, 1903.—Fossil Floras of Cape Colony. *Ann. S. Af. Mus.*, iv, part 1.

————, 1904.—On a Collection of Jurassic Plants from Victoria. *Rec. Geol. Surv. Victoria*, i (3), p. 155.

————, 1910.—Fossil Plants, Vol. ii.

————, 1911.—The Jurassic Flora of Sutherland. *Trans. Roy. Soc. Edinburgh*, 47 (4), p. 643.

————, 1913.—Contribution to our Knowledge of Wealden Floras. *Quart. Journ. Geol. Soc.*, lxix, pp. 85-116.

Walkom, A. B., 1917*a*.—Mesozoic Floras of Queensland. Part 1 (contd.). *Q'land Geol. Survey Pub.* 257.

————, 1919.—On a Collection of Jurassic Plants from Bexhill, near Lismore, N.S.W. Proc. Linn. Soc. N.S.W., xliv, pp. 180-190.

————, 1919*a*.—Mesozoic Floras of Queensland, Parts 3 and 4. The Floras of the Burrum and Styx River Series. *Q'land Geol. Survey Pub.* 263.

EXPLANATION OF PLATES XIII–XIV.

(Figures are natural size except where marked.)

Plate xiii.

1. *Lycopodites* sp. B, slightly enlarged.
2. *Ruffordia Mortoni*, n. sp.
3, 4. *Hausmannia Wilkinsi*, n. sp. Fig. 4, slightly reduced.
5, 6, 7. *Nilssonia plutovillensis*, n. sp. Fig. 1, slightly reduced.
8. *Brachyphyllum crassum* (?), Tenison-Woods. × ¾. Shows some partly defoliated stem.
9, 10. *Elatocladus* cf. *conferta* (O. and M.), slightly reduced.

Plate xiv.

1, 2. *Nathorstia Willcoxi* Walkom. Fig. 1, × $^{11}/_{7}$; Fig. 2, × $^{5}/_{6}$. Figure 1 shows the fine network between the secondary veins.
3. *Microphyllopteris gleichenioides* (O. and M.), × $^{6}/_{5}$.
4. *Nilssonia* sp., × $^{9}/_{8}$.